

## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Contributing factors that influence medication errors in the pre-hospital paramedic environment: a mixed method systematic review protocol
<b>AUTHORS</b>	Walker, Dennis; Moloney, Clint; SueSee, Brendan; Sharples, Renee

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Lorelli Nowell University of Calgary, Canada
<b>REVIEW RETURNED</b>	19-Sep-2019

<b>GENERAL COMMENTS</b>	Thank you for the opportunity to review your protocol manuscript. Medication errors in pre-hospital paramedic environments is an important topic. Your plans to conduct a systematic review are well written and include a rigorous methodology supported by best practices in conducting systematic reviews. I look forward to reading the findings of your review.
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<b>REVIEWER</b>	Gerard Bury University College Dublin, General Practice
<b>REVIEW RETURNED</b>	18-Oct-2019

<b>GENERAL COMMENTS</b>	<p>A timely and useful study that, in general, approaches the issue appropriately. A few clarifications required.</p> <ol style="list-style-type: none"><li>1. There are a small number of misspellings / typos to be corrected.</li><li>2. I am unclear what this sentence means: 'Quantitative data will be extracted comprised of data-based outcomes of descriptive and/or inferential statistical tests.'</li><li>3. Why focus on 'latent' errors in the title? The methodology appears to include studies of both latent and actual errors and this should be reflected in the title.</li><li>4. The search strategy and analysis seem reasonable. Is it intended to carry out a meta-analysis of data if appropriate studies are identified?</li><li>5. The pre-hospital environment is a complex one, as described by the authors. The focus on medication errors is an appropriate one but is it intended to exclude other therapeutic modalities such as airways interventions, electrical therapies or immobilisation strategies which also have the potential for serious errors to impact on patient care? The authors might comment on how these issues should be addressed.</li></ol>
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	6. The absence of ethical approval or public / patient involvement is justified reasonably by the authors. However, the potential exists for this study to identify significant evidence of serious errors in EMS systems and of inadequate quality assurance mechanisms to address those issues. While this is crucial information, it is also important to preserve an appropriate level of public confidence in an essential service. Is a public / patient input to the presentation of the findings worth considering?
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## VERSION 1 – AUTHOR RESPONSE

With respect to specific feedback by reviewer 2:

1. There are a small number of misspellings / typos to be corrected.

Spelling and grammar have been checked and corrected throughout.

2. I am unclear what this sentence means: 'Quantitative data will be extracted comprised of data-based outcomes of descriptive and/or inferential statistical tests.'

This statement has been modified in the main text to:

“Quantitative outcome data will be extracted comprised of the numerical, data-based results of descriptive and/or inferential statistical tests.”

This statement acknowledges that numerical data extracted from quantitative studies will be in the form of the outcomes from descriptive or inferential statistical analysis, these representing the two broad areas of statistical analysis.

3. Why focus on 'latent' errors in the title? The methodology appears to include studies of both latent and actual errors and this should be reflected in the title.

We agree with this comment by reviewer 2, and have made amendments to the title sections and the review questions. This provides better alignment of the title with the overall goals of the study.

4. The search strategy and analysis seem reasonable. Is it intended to carry out a meta-analysis of data if appropriate studies are identified?

As the primary outcome of the systematic review is qualitative in nature, there are no plans to conduct a meta-analysis of the quantitative studies. Preliminary searches indicate that the data from the quantitative studies have outcomes too diverse for this to be practical.

5. The pre-hospital environment is a complex one, as described by the authors. The focus on medication errors is an appropriate one but is it intended to exclude other therapeutic modalities such as airways interventions, electrical therapies or immobilisation strategies which also have the potential for serious errors to impact on patient care? The authors might comment on how these issues should be addressed.

This has been addressed by adding a section to the introduction of the protocol:

“There is a significant need to conduct a current review on medication errors, as the review by Bigham et al.[8] is not specific to medication errors, and is now out of date. It is acknowledged that other areas of care addressed by Bigham et al.[8] may be influenced by similar factors specific to the pre-hospital environment. Interventions such as airway management, defibrillation and immobilisation

have their own specific risk profiles and bodies of evidence; it is the opinion of the authors that these areas of pre-hospital care deserve their own focused research.”

While these areas of practice may certainly be affected by factors similar to those which influence medication error, they are outside of the scope of the planned research. As stated above, each represents a very specific risk profile, and is deserving of its own focused research.

6. The absence of ethical approval or public / patient involvement is justified reasonably by the authors. However, the potential exists for this study to identify significant evidence of serious errors in EMS systems and of inadequate quality assurance mechanisms to address those issues. While this is crucial information, it is also important to preserve an appropriate level of public confidence in an essential service. Is a public / patient input to the presentation of the findings worth considering?

This systematic review will be defining the nature of errors and error producing conditions within the pre-hospital environment, but will not be quantifying them. From this perspective, the potential to erode confidence in paramedic services is minimal. In collating and synthesising the available research via a systematic review, we will not be presenting any research findings that are not already public knowledge.

This systematic review is the first stage of a larger mixed method research project, with the second stage being primary research involving quantification of the factors identified in the systematic review. For that future research, we are considering a number of public consultation strategies given its potential to identify systemic issues and/or error producing conditions/policies/practices, as highlighted by reviewer 2.

#### **VERSION 2 – REVIEW**

<b>REVIEWER</b>	Gerard Bury University College Dublin, General Practice
<b>REVIEW RETURNED</b>	25-Nov-2019
<b>GENERAL COMMENTS</b>	Thank you for revisions. Happy to recommend publication.